

STEVENS CREEK BRIDGE  
Mount Rainier National Park  
Spanning Stevens Creek on Stevens Canyon Highway  
Packwood Vicinity  
Lewis County  
Washington

HAER No. WA-58

HAER  
WASH  
21-PACK.V  
7-

PHOTOGRAPHS

WRITTEN HISTORICAL AND DESCRIPTIVE DATA

REDUCED COPIES OF MEASURED DRAWINGS

HISTORIC AMERICAN ENGINEERING RECORD  
National Park Service  
U.S. Department of the Interior  
P.O. Box 37127  
Washington, D.C. 20013-7127

HISTORIC AMERICAN ENGINEERING RECORD

STEVENS CREEK BRIDGE  
Mount Rainier National Park  
HAER No. WA-58

HAER  
WASH  
21-PACK.V  
7-

I. INTRODUCTION

**Location:** Spanning Stevens Creek on Stevens Canyon Highway at head of Stevens Creek Canyon, 1½ miles southeast of Paradise, Mount Rainier National Park, Lewis County, Washington.  
Quad: Mount Rainier East, Wash.  
UTM: 10/599175/5180850

**Date of Construction:** 1940-41

**Structure type:** Stone-faced reinforced concrete rigid frame T-beam bridge with five arched girders

**FHWA Structure No.:** 9450-009P

**Designer:** Western Office, Bureau of Public Roads, San Francisco

**Contractor:** Sam Orino, Portland, Oregon

**Engineers:** John Zoss, Resident Engineer, Public Roads Administration  
R.I. Thomas, Resident Engineer, Public Roads Administration

**Owner:** Mount Rainier National Park, National Park Service

**Use:** Park highway bridge

**Significance:** The Stevens Creek Bridge represents a transition in the park road bridges from standard reinforced concrete arches to arched girder designs. Its stone facing is characteristic of the National Park Service's widely-employed "rustic style" which dictated that structures should harmonize with their surroundings.

**Project Information:** Documentation of the Stevens Creek Bridge is part of the Mount Rainier National Park Roads and Bridges Recording Project, conducted in summer 1992 by the Historic American Engineering Record.  
Richard H. Quin, HAER Historian, 1992

## II. HISTORY

This is one in a series of reports prepared for the Mount Rainier National Park Roads and Bridges Recording Project. HAER No. WA-35, MOUNT RAINIER NATIONAL PARK ROADS AND BRIDGES, contains an overview history of the park roads. In addition, HAER No. WA-123, STEVENS CANYON HIGHWAY, contains more specific information on the road on which the structure is located.

### Stevens Canyon Highway

The 21.2-mile Stevens Canyon Highway departs from the Nisqually Road [HAER No. WA-119] above Narada Falls, climbs to a saddle at Reflection Lakes, then drops into the Stevens Creek Canyon. The road then traverses the cliffs on the north side of the canyon down as far as the Box Canyon of the Cowlitz River. From there, the road heads generally southeast around Backbone Ridge to a junction with the East Side Road [Washington Highway 123, HAER No. WA-124]. Although the road was not completed until 1957, even much of the later work was done in the "Rustic Style," including bridges at Box Canyon [HAER No. WA-60], Nickel Creek [HAER No. WA-59] and Stevens Creek [HAER No. WA-58], a fine stone culvert at Sunbeam Creek, two short tunnels and masonry retaining and parapet walls. The later work includes a series of reinforced concrete viaducts [HAER No. WA-71] which carry the road around steep sections of cliffs in Stevens Canyon and on the sides of Backbone Ridge, alleviating much scarring.

### Stevens Creek Bridge

Location surveys for the Stevens Canyon Highway were completed by the Bureau of Public Roads in 1932. Foundation investigations at the Stevens Creek crossing site were conducted in 1937, and plans for the bridge were prepared at the San Francisco regional office of the Public Roads Administration (the Depression-era successor to the Bureau of Public Roads) in 1939.<sup>1</sup> A temporary, detour bridge was constructed at the crossing in the spring of 1934 by the Colonial Construction Company, contractors for an adjacent highway grading project. The structure was rated for a 1½ ton steam shovel and cost \$300.<sup>2</sup>

The bridge contract was awarded to Sam Orino of Portland, Oregon, on the basis of his low bid submitted 6 December 1939. Construction began the following spring, on 1 May 1940, with the erection of a new temporary span. John Zoss, Associate Highway Engineer for the Public Roads Administration, was resident engineer for the project until 3 September, when he was replaced by Associate Highway Engineer R. I. Thomas. Both worked under the general supervision of George B. Forrest, supervising resident engineer for the PRA.<sup>3</sup>

Concrete aggregates were taken from the Nisqually River near Ashford, Washington, just outside the park's western boundary. Santa Cruz cement was also for the concrete. Reinforcing steel was obtained from the Seattle Steel Company. The light grey andesite rock used for the masonry was taken from a quarry ¼-mile east of the project. This high-quality stone could be taken out in large slabs and easily cut to dimension. The arch ring stones or voussoirs and whole wall sections were laid out on platforms, and exact outline patterns were made at the quarry. According to the resident engineer, this procedure expedited the cutting and placing of the stones.<sup>4</sup>

Excavation for abutment #2 was begun on 9 May 1940. The excavation was carried out by blasting in solid rock and removing the debris by hand, a laborious process. Abutment #1 was also excavated by hand, but a steam shovel was used to load the material. The foundation for the long northeast wing wall was excavated with a drag line. The removed material was stockpiled and used as backfill for abutment #2 and the northeast wing.<sup>5</sup>

Concrete for the abutments was poured in June. Pumps had to be placed in

abutment #1 to keep water out. After the abutments were completed to the bottom of the girder columns, the masonry facing was constructed as high as the arched haunches of the curved girders. At the same time, falsework for the girders and forms for the girder columns were placed up to the construction joints. The superstructure falsework consisted of twelve timber frame bents resting on temporary concrete footings and boulders. The forms and falsework were completed on 6 August. Pouring of the concrete for the columns began the next day, and was carried out in three and one-half continuous eight-hour shifts. The next phase involved the excavation for the northwest and southeast wing walls; footings for these were poured on 16 August. The inside girder forms went up next and the reinforcing steel was placed on 23 August. The three inside girders were poured in two sections on 25 and 27 August. "High Early Strength Cement" was used for these forms so they could support a derrick for the setting of the stone voussoirs and spandrel walls from the center of the spans.<sup>6</sup>

The arch ring stones were placed on 8 September and the spandrel walls were raised to the top of the slab by the 20th. Forms for the outside girders A and E were completed the next day and the concrete was poured on 24 September. While this work was in progress, the masonry wing walls were raised to the bottom of the railing and footings were poured for the southwest wing wall.<sup>7</sup>

Forms for the bridge deck were completed on 29 September, and the reinforcing steel was placed on 1 October. The concrete slab was poured the following day. The masonry facing for the concrete portion of the southwest wing wall was completed at about the same time and the concrete was poured on 3 October. Footings for the northeast wing wall were poured between 15 October and 7 November. More rock facing was being placed when winter weather forced a project shutdown on 27 November.<sup>8</sup>

The work resumed on 1 May 1941. By the 19th, the stone facing was completed and all concrete work was finished on 2 June. The guard walls or railing and the curb stones were placed by 5 July and cleanup began four days later.<sup>9</sup> The bridge was inspected by Park Superintendent John C. Preston and National Park Service Branch of Plans and Design Landscape Architect Frank C. Mattson on 11 September. They recommended acceptance of the project.<sup>10</sup>

A bridge safety inspection report by the Federal Highway Administration in September 1975 found the bridge in good condition. The report noted that drain holes had been plugged, and that the stone guard walls did not meet AASHTO safety standards.<sup>11</sup>

#### Description

[Adapted from the BPR Final Construction Report]

The structure is a reinforced concrete rigid frame, tee beam design bridge with five arched girders. The outside girders and the exposed surfaces of the reinforced concrete abutments and wing walls are faced with stone masonry, including voussoirs for the girders, giving the structure the appearance of a masonry arch bridge. The single arch has a clear span of 78' and rises 7' 2½" from the spring line. The wing walls are partly reinforced concrete cantilever walls faced with stone and partly of solid masonry construction. The guard wall and curbs are also of stone construction. The bridge is built on an 18° curve, but with the exception of the downstream road wing walls, the road crosses on a tangent.

The southwest and northwest wing walls each extend 43' beyond the bridge. The southeast wing is 30' long and ties into a parking area. The northeast wing wall is 133.4' long and acts as a retaining wall for the approach. It stands

30' high exclusive of the railing. For half of its length, it is a cantilever type masonry faced reinforced concrete wall and the balance is a solid masonry wall resting on a solid rock foundation. Stone used in the construction is a light gray andesite. The concrete deck is surfaced with an asphaltic roadway and has a curved sidewalk on the south or downstream side only.

The arched reinforced concrete girders are of particular interest. The ends of the girders are not fixed, but are rounded and rest on cupped supports. They are held in place by gravity, rather than by cramps or fixed joints, and act in the same manner as rocker hinges. The Stevens Creek Bridge is the only structure of this design in Mount Rainier National Park.

Stevens Creek is a boulder-strewn glacial stream, subject to wide fluctuations in flow, thus necessitating the considerable arch span over the stream. Two forks of the creek join just above the bridge site. During the construction of the bridge, a steam shovel was used to clear and excavate in the stream bed just above the site, exposing a small waterfall which would be visible at high water. A natural stone seat on the northeast bank of the main stream, called the "Grandfather's Chair," was also exposed. [The lack of a trail suggests few people visit this gargantuan settee.] This bit of landscape tinkering helped create a visual appeal for motorists and pedestrians crossing the bridge. The span is located in the intermediate forest zone at the head of the steep Stevens Creek Canyon, and is flanked by small conifers, dense understory growth, and several expanses of mountain meadows with the rich wildflowers for which Mount Rainier National Park is famous. The stone facing of the bridge gives the appearance of a masonry arched structure and is characteristic of the so-called "rustic style" of architecture prevalent in the national parks.

III. ENDNOTES

1. John Zoss, Associate Highway Bridge Engineer, Federal Works Agency, Public Roads Administration, District No. 1, "Final Construction Report, Stevens Canyon Highway, Mt. Rainier National Park Project 4-C1, Stevens Creek Bridge and Approach Grading, Lewis County, Washington" (San Francisco, CA: Public Roads Administration, 27 July 1942), 7.
2. C. G. Polk, Assistant Highway Engineer, Bureau of Public Roads, "Final Construction Report (1934-1935) on Stevens Canyon Highway, Mt. Rainier National Park Project NR 4C-1, Grading, Mt. Rainier National Park, State of Washington," 1936, 6.
3. Zoss, 4, 7.
4. *Ibid.*, 4, 6.
5. *Ibid.*, 5.
6. *Ibid.*.
7. *Ibid.*.
8. *Ibid.*, 6.
9. *Ibid.*.
10. John C. Preston, Superintendent, Mount Rainier National Park, to W. H. Lynch, District Engineer, Federal Works Agency, Public Roads Administration, Portland, OR, 11 September 1941; Thomas E. Carpenter, Deputy Chief of Planning, National Park Service, Branch of Plans and Design, San Francisco, to Lynch, 15 September 1941. Both attached to Zoss report as appendices.
11. U.S. Department of Transportation, Federal Highway Administration, Region 8 Office of Western Bridge Design. "Bridge Safety Inspection Report, Stevens Creek Bridge, Mt. Rainier N.P., Structure No. 9450-009P," (Denver, CO: Federal Highway Administration, September 1975), 1.

#### IV. BIBLIOGRAPHY

- Carpenter, Thomas E., Deputy Chief of Planning, National Park Service, Branch of Plans and Design, San Francisco, to W.H. Lynch, District Engineer, Federal Works Agency, Public Roads Administration, Portland, OR, 15 September 1941.
- Federal Works Agency, Public Roads Administration. "Stevens Creek Bridge, Stevens Canyon Highway--Sta. 231, Rainier National Park Project 4C-1." Construction drawings RG 728 A-L, 12 sheets, September 1939.
- Polk, C. G., Assistant Highway Engineer, Bureau of Public Roads. "Final Construction Report (1934-1935) on Stevens Canyon Highway, Mt. Rainier National Park Project NR 4C-1, Grading, Mt. Rainier National Park, State of Washington." Portland, OR: Bureau of Public Roads, 1936.
- Preston, John C., Superintendent, Mount Rainier National Park, to W. H. Lynch, District Engineer, Federal Works Agency, Public Roads Administration, Portland, OR, 11 September 1941.
- U.S. Department of the Interior, National Park Service, Branch of Plans and Design. "Preliminary Architectural Plans, Stevens Creek Bridge, Mount Rainier National Park." Construction NP RAI 2105, 3 sheets. San Francisco, CA: National Park Service, Branch of Plans and Design, 19 January 1939. Engineering Division files, Mount Rainier National Park.
- U.S. Department of Transportation, Federal Highway Administration, Region 8 Office of Western Bridge Design. "Bridge Safety Inspection Report, Stevens Creek Bridge, Mt. Rainier N.P., Structure No. 9450-009P." Denver, CO: Federal Highway Administration, September 1975.
- Zoss, John, Associate Highway Bridge Engineer, Federal Works Agency, Public Roads Administration, District No. 1. "Final Construction Report, Stevens Canyon Highway, Mt. Rainier National Park Project 4-C1, Stevens Creek Bridge and Approach Grading, Lewis County, Washington." San Francisco, CA: Public Roads Administration, 27 July 1942.

ADDENDUM TO

STEVENS CREEK BRIDGE ← Mount Rainier National Park Roads & Bridges  
Spanning Stevena Creek on Stevens Canyon Highway  
Packwood Vicinity  
Lewis County  
Washington

HAER No. WA-58

HAER  
WASH  
21-PACK.V,  
7-

XEROGRAPHIC COPIES OF COLOR TRANSPARENCIES

HISTORIC AMERICAN ENGINEERING RECORD  
National Park Service  
Department of the Interior  
P.O. Box 37127  
Washington, D.C. 20013-7127